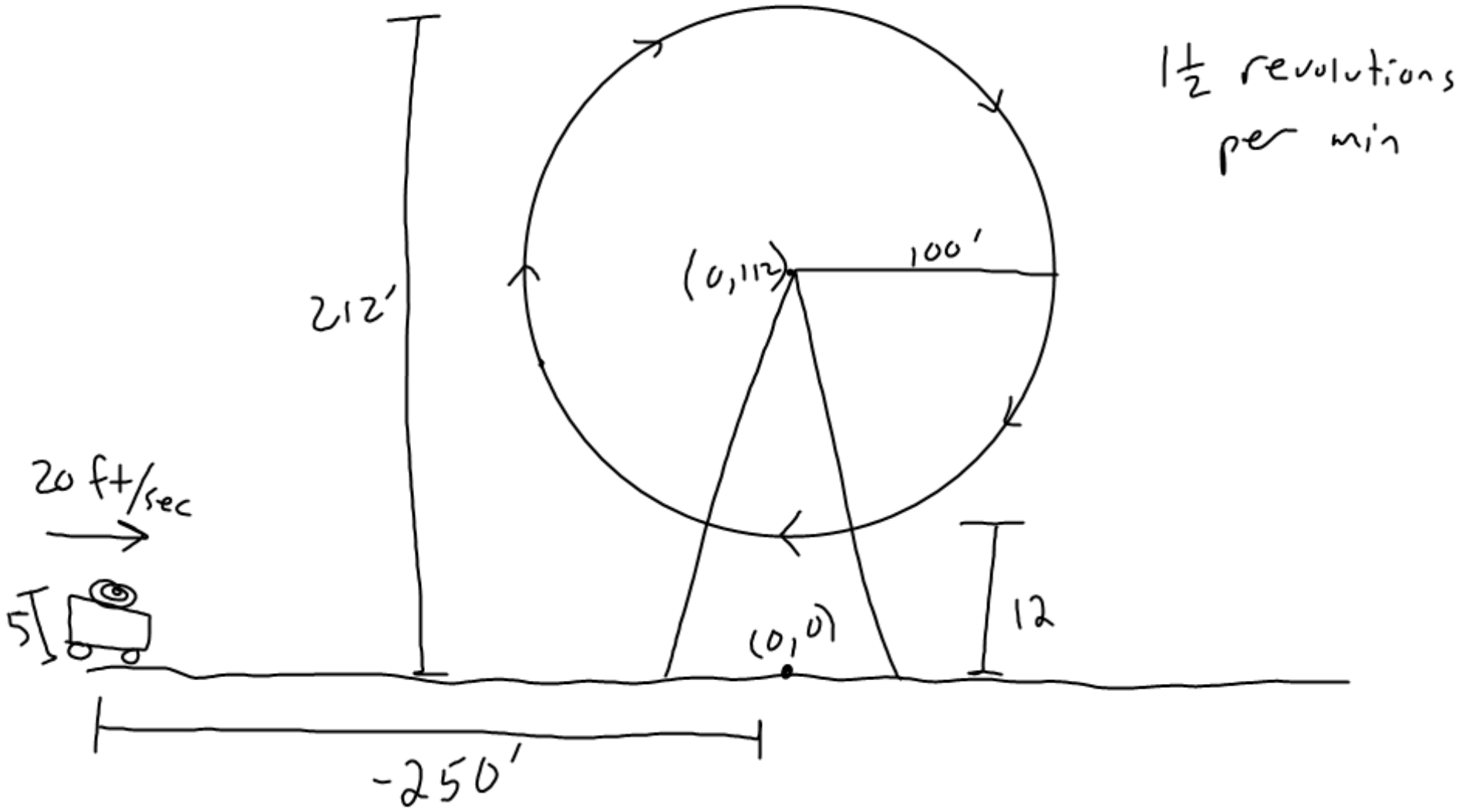

1½ revolutions per min
212'
(0,112)
100'
20 ft/sec
5
12
(0,0)
-250'

What we need to know

- Starting 6:00 position $s_0 = \frac{1}{2}(-32)t^2$
- gravity, speed of dart, drop time $h(t) = -16t^2 + s_0$ (h: height, t: time, s_0: initial height)
- Circumference $C = 2\pi r \rightarrow \approx 628.32$ $= 200\pi$
- Angular velocity of wheel $\omega = \frac{\theta}{t} = \frac{3\pi}{60\text{sec.}} = \frac{\pi}{20}$ 0.05π
- linear velocity of wheel $v = r\omega$ $v = 5\pi$
- position of cart as a function of time
- our position as a function of time
  - horz. eq
  - vertical eq.

$$h(t) = -16t^2 + s_0$$

- $h(t)$: height at time t
- -16: gravity
- t: time sec
- s_0: initial height in feet

$s_0 = 12$

x - wait time (how long on wheel)

t - drop time

(1) How long to hit ground from 6:00, 9:00, 12:00, 3:00, 5:00?

(2) How long to hit cart from 6:00, 9:00, 12:00, 3:00?

(3) How long to hit cart after 3 sec. from start? 34 sec?

To Cart

6:00 → 0.66145 sec.
0 sec
40 sec

9:00 → 2.5860 sec.
10 sec

12:00 → 3.5969 sec.
20 sec

3:00 → 2.5860 sec.
30 sec

class verified times

For Tues

- Come up with an equation for dropline as a function of x (wait time) to cart.

For Thursday

- write up horz. & vert. position (write up #1)
  - Correct equations with all #'s/variables defined (4 pts)
  - why $\frac{\pi}{20}$, how you found it, what it means (2 pts)
  - why sin/cos (2 pts)
  - How you tested (2 pts) proof your equation works

HW

- Sect. 7.3 #1-7, 13-16, 40, 41, 49, 51, 52, 56
  ↓ see p. 296

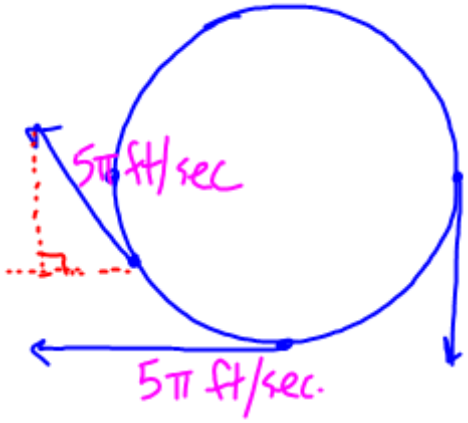
- Write up for drop time and cart due Mon. (Write up #2)
  - Correct Equations with everything defined (2pts each)
  - Why are we starting with the equation $h(t) = -16t^2 + S_0$ and what do those variables mean (1pt)
  - How and why are we substituting for S_0 and t in the drop time and cart equations? (3pts)
  - How can you check your equations? (2pts)

(1) What is the angular velocity?

$\omega = \frac{\theta}{t} \rightarrow \frac{\pi}{20}$ rad/sec.

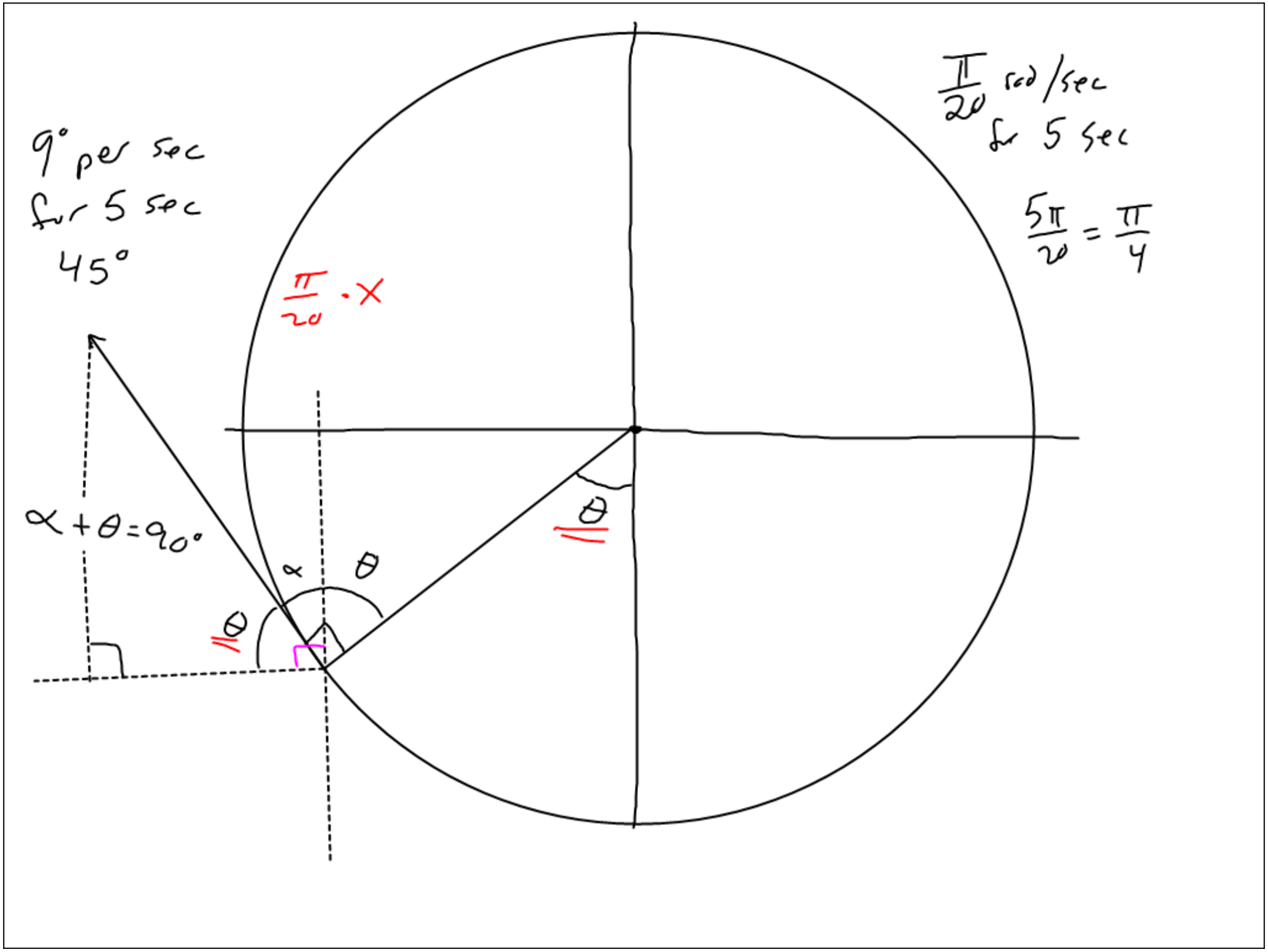
(2) What is the linear velocity?

$5\pi \simeq 15.7$ ft/sec.



(3) Complete the table

Wait Time	Angle	Horz. comp. of vel.	vert. comp. of vel
5	45°	$-11.1\ (5\pi \cos 45)$	$5\pi \sin 45°$ 11.1
10	90°	○	5π
15	45°	11.1	11.1
20	0°	5π	0


9° per sec
for 5 sec
45°
π/20 rad/sec
for 5 sec
5π/20 = π/4
π/20 · X
α + θ = 90°
α
θ
θ
θ

(write up #3)

Horz. / vert. Component of velocity

Due Thursday

- Equations
  - Vert. velocity equation + defined (2 pts)
  - Horz. velocity equation + defined (2 pts)
- Explained
  - Why / how do we use 5π (15.7)? (1 pt.)
  - Why / how do we use sine / cosine? (1 pt.)
- Test
  - How do you test your equations? (1 pt.)
  - Why those pts? (1 pt.)

Drop time with velocity

$h(t) = -16t^2 + V_0 t + S_0$

- t = time
- $h(t)$ → height
- $-16t^2$ → gravity
- $V_0 t$ → initial velocity (ft/sec)
- S_0 → initial height (ft)

w/o velocity

$h(t) = -16t^2 + S_0$

Write Up for Drop Time with Velocity - Due Friday #4

- Equation for drop time (2 pts - define)
- How derived
  - where you started (2 pts)
  - What V_0 + S_0 are and why (2 pts)
  - how solved (2 pts)
- Test (2 pts)